

Si-O-Si bonds, wherein at least one of said phenyl groups bears a reactive functional group.

18. (New) The functionalized silsesquioxane of claim 17, wherein said silsesquioxane nanoparticle has a cage structure and contains 6 to 24 and preferably 8 reactive functional groups.

19. (New) The functionalized silsesquioxane of claim 17, selected from the group of octakis(aminophenyl)silsesquioxane, octakis(N-maleimidoaminophenyl)silsesquioxane, octakis(acetylphenyl)silsesquioxane, and octakis(bromophenyl)silsesquioxane).

20. (New) A method of preparing the functionalized silsesquioxane macromonomers of claim 17, said method comprising providing a phenyl-substituted silsesquioxane and substituting phenyl group(s) of said phenyl-substituted silsesquioxane with a reactive functional group or precursor thereof.

21. (New) The method of claim 20, comprising nitrating phenyl groups of said phenyl-substituted silsesquioxane to form a nitrophenyl-substituted silsesquioxane followed by reducing the nitrophenyl groups to aminophenyl groups to form an aminophenyl-substituted silsesquioxane.

22. (New) The method of claim 20, wherein said phenyl-substituted silsesquioxane is functionalized by electrophilic substitution of a functional group or precursor thereof for a ring hydrogen of the phenyl substituents.

23. (New) The method of claim 20, wherein said reactive functional group is selected from the group consisting of halo, amino, imino, epoxy, carboxylic acid, carbonyl chloride, carbonate, isocyanate, cyanate, maleimide, ethylenic unsaturation, ethylnic unsaturation, hydroxyl, acyl, hydroxyalkyl, and sulfonyl.

24. (New) The method of claim 22, wherein said reactive functional group is selected from the group consisting of halo, amino, imino, epoxy, carboxylic acid, carbonyl chloride, carbonate, isocyanate, cyanate, maleimide, ethylenic unsaturation, ethylnic unsaturation, hydroxyl, acyl, hydroxyalkyl, and sulfonyl.

25. (New) A nanocomposite material containing the functionalized silsesquioxane macromonomer of claim 17 or Si-O-Si linked oligomers or polymers thereof.

26. (New) The nanocomposite material of claim 23 comprising a multilayer structure, said multilayer structure comprising layers of the functionalized silsesquioxane of claim 1 or Si-O-Si linked oligomers or polymers thereof.

27. (New) The nanocomposite material of claim 25, wherein alternating layers of functionalized silsesquioxanes are chemically bonded by means of di-or polyfunctional spacer molecules.

28. (New) The nanocomposite material of claim 26, wherein alternating layers of functionalized silsesquioxanes are chemically bonded by means of di-or polyfunctional spacer molecules.


29. (New) The nanocomposite material of claim 27 wherein said spacer molecules comprise a non-phenyl substituted, functionalized silsesquioxane macromonomer, preferably an octakis(epoxyalkyl) silsesquioxane.

30. (New) The nanocomposite material of claim 25 which has a core/shell structure.

31. (New) The nanocomposite material of claim 26 which has a core/shell structure.

32. (New) The nanocomposite material of claim 27 which has a core/shell structure.

33. (New) The nanocomposite material of claim 29 which has a core/shell structure.

 34. (New) The nanocomposite material of claim 25 comprising the functionalized silsesquioxane of claim 1 or Si-O-Si linked oligomers or polymers thereof as a dispersed phase, chemically bonded to a continuous thermoset or thermoplastic polymer matrix.

35. (New) A nanocomposite comprising the nanocomposite material of claim 27 as a disposed phase, chemically bonded to a continuous thermoset or thermoplastic polymer matrix.

36. (New) A nanocomposite comprising the nanocomposite material of claim 30 as a disposed phase, chemically bonded to a continuous thermoset or thermoplastic polymer matrix.

37. (New) In a luminescent nanocomposite-containing display; a nanocomposite porous filtration medium or an electrically conductive nanocomposite material, the improvement comprising incorporating into said display, filtration medium, or nanocomposite material the nanoparticles of claim 17.

38. (New) In a process for the preparation of a functionalized silsesquioxane wherein a silica source is converted to polyanionic form employing a quaternary ammonium hydroxide, followed by reaction with a hydridoalkylchlorosilane to form a silsesquioxane bearing hydridosilyl-functional reactive groups, and optionally employing said silsesquioxane bearing hydridosilyl-functional reactive groups to hydrosilylate an unsaturated organic compound, the improvement comprising selecting as the silica source a silica source obtained from the combustion or calcination of silica-containing natural products.

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39. (New) The process of claim 38 wherein said silica source is one or more of fly ash or rice hull ash.

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